Amendments to the Substitute Specification:

Please replace paragraph [0002] as follows:

Description of the Prior Art

[0002] There are well-known methods for determining the wettability of rocks to ~~the~~ any contained water and oil ~~that they may contain~~, comprising carrying out rock drainage cycles, that is displacement of fluids intended to decrease the water saturation, followed by imbibition[,]. ~~this term relating~~ Imbibition relates to a displacement of ~~the~~ fluids allowing an increase in the water saturation (Sw) of the rock. The capillary pressure Pc at one point is defined as the difference at equilibrium between the pressure P(oil) of the oil and the pressure P(water) of the water. This parameter ~~makes sense~~ is useful only if the two fluids are in the continuous phase in the porous medium. For a water wet medium, only the positive values ~~make sense~~ are useful. On the other hand, when the medium has a mixed wettability, the fluids can remain in the continuous phase for the positive as well as for the negative capillary pressures (Pc).

Please replace paragraph [0009] as follows:

[0009] According to another method, referred to as a "dynamic" method, a sample is placed in an elongate cell having water-permeable membranes at its two ends. At a first end, oil under pressure is directly injected into the enclosure. Water is also injected, but this injection is carried out through the membrane and at a lower pressure. At the opposite end, the oil is directly discharged whereas the water flows out through the terminal membrane. Adjustment of the oil and water injection rates allows the capillary pressure to be the same at the inlet and at the outlet of the enclosure, which leads to a

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uniform saturation that can be deduced from the fluids balance. The capillary pressure is obtained for example by measuring the difference between the pressure of the oil and of the water at the enclosure outlet. Such a method is notably described by Brown H.W. in "Capillary Pressure Investigations" , Petroleum Transaction AIME, vol.192, 1951. Examples of implementation are for example described in patents European Patent 729,022 corresponding to U.s. Patent 5,698,772 or EP Patent 974,839 corresponding to U.S. Patent 6,229,312 filed by the Assignee.

Please replace paragraph [0023] as follows:

[0023] Experience shows that the measurement of I_{NMR} obtained by means of the method is as sensitive but ~~that it~~ requires much less time and ~~that it~~ is applicable to a large number of samples.

Please replace paragraphs [0026] and [0027] as follows:

[0026] Figs. ~~2a~~ 2A and ~~2b~~ 2B respectively show the distribution of relaxation times T_2 for a water wet rock saturated with water and oil, and a representation of the phase distribution (matrix in hatched lines, water in light grey and oil in darker grey);

[0027] Figs. ~~3a~~ 3A and ~~3b~~ 3B respectively show the distribution of relaxation times T_2 for a rock of intermediate wettability saturated with water and oil (same central part as in ~~Figure~~ Fig. 2), and a representation of the phase distribution (matrix in hatched lines, water in light grey and oil in darker grey);

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Please replace paragraph [0037] as follows:

[0037]   When two fluids are present in a pore within the porous medium, the same physical diffusion mechanism is valid, but the distribution of the two fluids in relation to the pore surface is of crucial importance. For example, when the medium is water wet, the water is at the surface and interacts therewith, whereas the oil is inside the pore and does not interact with the surface. When the distribution of the relaxation times is measured for such a system, the result of Fig. 2a 2A is observed. The water has shorter relaxation times than in the case of a 100 % water saturation, because the volume of water V has decreased (see equation 1). The oil is characterized by a relaxation time that is the same as when the measurement is performed outside the porous medium ($T_{1B,2B}$) because there is no interaction with the pore surface. Besides, it is well-known that interactions at the water/oil interface do not lead to a relaxation that is different from that of the oil outside the porous medium, provided that the oil considered is light (refined oil such as dodecane). Diagrammatically, the phase distribution is shown in Fig. 2b 2B. When the same porous medium has a different wettability and is not clearly water wet, the distribution of the relaxation times is modified (Fig. 3a 3A). Essentially, the characteristic time of the oil will be shorter as a result of an interaction of the oil at the pore surface because the water is no longer the closer to the surface. The possible distribution of the two fluids is shown in Fig. 3b 3B. Such an effect has been obtained using standard procedures allowing to reproduce the surface properties of rocks from a petroleum reservoir : cleaning, then aging in the reservoir oil at the temperature of the reservoir at the irreducible water saturation.

Please replace paragraphs [0041] and [0042] as follows:

[0041] The most suitable saturations for measuring quantities SM_w and SM_o thus remain to be determined. For reasons linked with the calculation of the relaxation time distributions, we the irreducible water saturation (Swi, Fig. 4) is selected to determine the oil wet surface in the presence of water (SM_w), and the residual oil saturation (Sor, ~~Figure~~ Fig. 4) to determine the water wet surface in the presence of oil. Also, an oil whose intrinsic relaxation time (T_B) is as great as possible and as close as possible to water is selected. In fact, if T_B is too small, the method will be limited to porous media whose ratio S/V is high (small pore sizes), or to media whose surface relaxivity is high. Dodecane for example is a refined oil which is suited to the proposed measurement because its intrinsic relaxation time (T_{Bo}) is 1 s, close to the relaxation time of water (T_{Bw}, about 2.7 s). Crude petroleum oils should generally not be used because their relaxation times are too small and they also have a relaxation time distribution which considerably hinders analysis. The practical details of the calculation are given below.

[0042] From the distribution of the relaxation times at the different saturations (See the example of Fig. 5), the relaxation time corresponding to the dominant peak (Tw at Sor, To at Swi) can be easily determined, and these values are used in relation 5. It is well-known that determination of the dominant relaxation time is robust and depends little on the distribution calculation process. It can be noted that the dominant peak corresponds to that of the oil at Swi and of the water at Sor. The presence of the second fluid at these different saturations is important from a physical point of view, but it disturbs calculation very little. It can be shown that whatever the relaxation time of the second fluid present in small amount (water at Swi, oil at Sor), the relaxation time of the dominant fluid does not fluctuate much. This aspect is important for the calculation

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robustness. Fig. 5 shows the distribution of the transverse relaxation times T_2. The longitudinal relaxation time T_1 can also be used, but this measurement is less favourable in general because $T_1 > T_2$ but $T_{1B} = T_{2B}$ for a given fluid.

Please replace paragraph [0045] as follows:

Implementation

[0045] For implementing the method, an NMR measuring device conventionally comprising (Fig.7) magnets 1 with an air gap in which coils 2 are arranged is used. The coils are connected to an electronic box which generates the excitation signals (signals in the radio frequency range for example) creating an oscillating electric field for acquiring the response of sample S to the excitation signals. A device of this type is used for example in French patent ~~application~~ 2,823,308.